droplets. The right-angled bend provides a very efficient means of promoting desolvation and preventing solvent cluster formation. Furthermore, the right-angled bend in the ion source interface region slows down the gas flow rate through the extraction chamber. This in turn increases the ion residence time in the extraction region 200 and increases the probability of ion extraction through the exit orifice cone 130. As seen in Fig. 1, the optical axis of the exit orifice cone 130 is generally parallel to that of the entrance orifice cone 70. However, previous API sources have had a direct line of sight between the entrance aperture to the ion block and the exit aperture thereof which allowed ionised droplets to "stream" from the entrance to the exit. --

Please replace the paragraph beginning at page 10, line 38, with the following rewritten paragraph:

-- Referring to Fig. 1 once more, it will be seen that the inlet channel 60 has a smaller sectional area than that of the outlet channel. For example, the inlet channel 60 may have a diameter of approximately 2 mm, the outlet channel having a larger diameter of about 3 mm. This throttling of the ionised droplets as they pass from the entrance orifice cone 70 to the exit orifice cone 130 or to exhaust allows optimum pressure in the extraction region 200 to be achieved. --

REMARKS

Reconsideration is respectfully requested in light of the following remarks. Claims 1-8 are pending.

The drawing was objected to for not being labeled and for including a reference numeral not included in the specification. Applicant submits a corrected drawing herewith including the label "Fig. 1". A formal drawing will be submitted upon approval of the corrected drawing. Pursuant to Examiner's request, the specification has been amended to include reference numeral 20 and to refer to the drawing as "Fig. 1". The drawing was amended for clarification only and thus no new matter has been added.

The specification has been further amended to include section headings as suggested by the Examiner. A marked-up version of the amended specification is attached pursuant to CFR § 1.121. The specification was amended for clarification only and thus no new matter has been added.

Rejection of Claims 1-8 under 35 U.S.C. § 103

Claims 1-8 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,756,994 to Bajic (hereinafter "Bajic I") in view of UK Patent Application No. 2,324,906 A to Bajic

(hereinafter "Bajic II"). With respect to independent claim 1, Applicant respectfully traverses this rejection on the grounds that the rejection is improper because Bajic I and Bajic II neither teach nor suggest the claimed subject matter.

Applicant respectfully traverses this rejection on the grounds that these references are defective in establishing a prima facie case of obviousness with respect to claim 1.

As the PTO recognizes in MPEP § 2142:

> ... *The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. If the Examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of nonobviousness...*

It is submitted that, in the present case, the Examiner has not factually supported a prima facie case of obviousness. Moreover, the combination of Bajic I and Bajic II is improper. § 2142 of the MPEP provides:

> *... the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made.... The examiner must put aside knowledge of the applicant's disclosure, refrain from using hindsight, and consider the subject matter claimed 'as a whole'.*

Bajic I expressly provides for a linear trajectory 14 between an entrance orifice 10 and an evacuation port 4. *Bajic I, col. 6, line 43, and Fig. 1.* As the Examiner has conceded, Bajic I thus discloses an arrangement where the exit aperture *is* within the line of sight of the entrance orifice. Bajic I also specifically teaches that the primary purpose of the linear trajectory 14 is to allow "very efficient removal of neutral solvent molecules from the extraction chamber 15 and for minimizing the number of neutral molecules which pass through the exit orifice means". *Bajic I, col. 6, lines 43-50.* Thus, far from suggesting to the person of ordinary skill that it may be beneficial to have the exit aperture out of the line of sight of the entrance aperture, Bajic I by contrast suggests that it is essential, for the proper working of the device, that there *is* a line of sight between these two. It is therefore to be stressed that Bajic I does not discuss any problems with streaming of ions from the entrance to the exit orifices.

Even if the skilled person were to decide to try to modify the arrangement of Bajic I, he would not be lead to the claimed invention by the disclosure of Bajic II. As will be understood from a review of this document and in particular Figure 1 in that, the exit orifice 5 is arranged in a dead region where there is no net flow of ions. This dead region is, in fact, a "backwater" which is *out* of the flow path between the entrance orifice 5 and the vacuum outlet 19. The majority of the ions entering the interface chamber in Bajic II travel along this path and do NOT pass by the exit orifice 7, which is in the dead region: "The

greater proportion of the flow passes into one arm of the T towards the vacuum outlet 19" *Bajic II, page 12, lines 13-15.*Only a relatively smaller quantity of ions is moved out of this flow path and into the backwater region 20, and this is achieved through the geometry of the interface chamber 4 and in particular (but not exclusively) due to a disrupter pin 8 which introduces a degree of turbulence into the flow through the interface chamber.

Thus, even if the skilled person were to look to the disclosures of Bajic II on seeking to modify Bajic I (which he has no motivation to do, and so which is *not* conceded, for the above reasons), he would even then not arrive at the invention as claimed. He would be taught instead that the prevention of streaming from entrance to exit orifice can be achieved by moving the exit orifice *out of the flow path from the entrance orifice to the evacuation port.* This in turn leads to a majority of the ions NOT passing by the exit aperture, where they might enter the mass spectrometer, but instead passing straight from the entrance aperture to exhaust without detection. By definition, therefore, the sensitivity of the instrument will be limited in Bajic II.

In Applicant's invention as claimed, by contrast, the exit orifice is "located in the flow passage between the entrance aperture and the exhaust port", and, moreover, "the flow passage is shaped to cause substantially all the gas and entrained sample ions entering the entrance orifice to flow within a distance "d" of the exit aperture", which distance is then defined in the independent claim.

Thus in summary, Bajic I and Bajic II cannot be combined to teach or suggest an exit aperture located in a flow passage between an entrance aperture and an exhaust port with the exit aperture being located out of the line of sight of the entrance aperture as specified and claimed in Applicant's claim 1. It is clear that Bajic I provides no incentive or motivation to combine with Bajic II especially in light of Bajic II's disclosure of providing the exit aperture in a dead volume region of substantially no net flow. Therefore, there is simply no basis in the art for combining the references to support a 35 USC § 103 rejection.

In this context, the MPEP further provides at § 2143.01:

> *The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.*

In the above context, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *See ATD Corp. v. Lydall, Inc.*, 159 F.3d 534 (Fed.

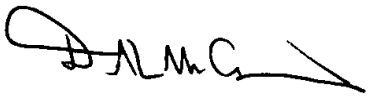
Cir. 1998) (holding that "[t]here must be a teaching or suggestion within the prior art ... to select particular elements, and to combine them in the way they were combined by the inventor").

In view of the foregoing, it is apparent that neither Bajic I nor Bajic II, either singly or in any combination, teach, suggest, or render obvious the unique combination recited in independent claim 1. It is therefore submitted that claim 1 distinguishes over the cited references in a patentable sense, and is therefore allowable over those references and the remaining references of record.

Claims 2-8 depend from and further limit independent claim 1 in a patentable sense, and, for this reason and the reasons set forth above, are also deemed to be in condition for allowance.

For the foregoing reasons and for other reasons clearly apparent, Applicant respectfully requests full allowance of claims 1-8.

Respectfully submitted,



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10 FEBRUARY 2003

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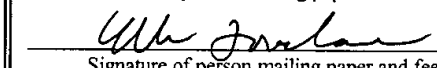

Signature of person mailing paper and fee

MARKED UP VERSION TO SHOW CHANGES

Please replace the paragraph beginning at page 7, line 32, with the following rewritten paragraph:

-- This invention may be put into practice in a number of ways, one of which will now be described by way of example only [and with reference to the drawing which shows a schematic view of an atmospheric pressure ion source according to an embodiment of the present invention, together with a part of a mass spectrometer]. --

Please replace the paragraph beginning at page 7, line 39, with the following rewritten paragraph:

-- DETAILED DESCRIPTION

The ion source of [the Figure] Fig. 1 has an ionisation region 10 at atmospheric pressure. Ionised sample droplets are presented at the ionisation region 10 by a capillary tube 30 held at a high potential and a nebulizer heater 40 which desolvates the sample droplets. As will be understood by the skilled person, this arrangement is part of an electro-spray source 20, although other known arrangements for generating ionised sample droplets might be used instead. --

Please replace the paragraph beginning at page 9, line 6, with the following rewritten paragraph:

-- As seen in [the Figure] Fig. 1, the ion block 50 has a frusto-conical opening therein. The lower end of the frusto-conical opening, which is of relatively smaller diameter, communicates with the outlet channel 80 approximately halfway along it between the inlet channel 60 and the evacuation chamber 90. The upper end of the frusto-conical opening in the ion block, which is of relatively large diameter, opens into a seat on the upper surface of the ion block 50. --

Please replace the paragraph beginning at page 9, line 23, with the following rewritten paragraph:

-- The exit orifice cone 130 serves to communicate between the outlet channel 80 of the ion source interface region and a spectrometer region shown in [the Figure] Fig. 1 generally at 150. The spectrometer region 150 typically includes a conventional quadrupole or magnetic sector mass spectrometer mounted within a housing shown in dotted line at 160. --

Please replace the paragraph beginning at page 10, line 16, with the following rewritten paragraph:

-- The intersection of the inlet and outlet channels at a 90° angle introduces a right-angled bend into the path (defined by the ion source interface region in the ion block 50) from the entrance orifice cone

70 to the extraction region 200. This introduces internal energy into the viscous flow stream of the ionised droplets. The right-angled bend provides a very efficient means of promoting desolvation and preventing solvent cluster formation. Furthermore, the right-angled bend in the ion source interface region slows down the gas flow rate through the extraction chamber. This in turn increases the ion residence time in the extraction region 200 and increases the probability of ion extraction through the exit orifice cone 130. As seen in [the Figure] Fig. 1, the optical axis of the exit orifice cone 130 is generally parallel to that of the entrance orifice cone 70. However, previous API sources have had a direct line of sight between the entrance aperture to the ion block and the exit aperture thereof which allowed ionised droplets to "stream" from the entrance to the exit. --

Please replace the paragraph beginning at page 10, line 38, with the following rewritten paragraph:

-- Referring to [the Figure] Fig. 1 once more, it will be seen that the inlet channel 60 has a smaller sectional area than that of the outlet channel. For example, the inlet channel 60 may have a diameter of approximately 2 mm, the outlet channel having a larger diameter of about 3 mm. This throttling of the ionised droplets as they pass from the entrance orifice cone 70 to the exit orifice cone 130 or to exhaust allows optimum pressure in the extraction region 200 to be achieved. --